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**Gender Differences at Critical
Transitions in the Careers of
Science, Engineering, and
Mathematics Faculty**

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M.I.T.**

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

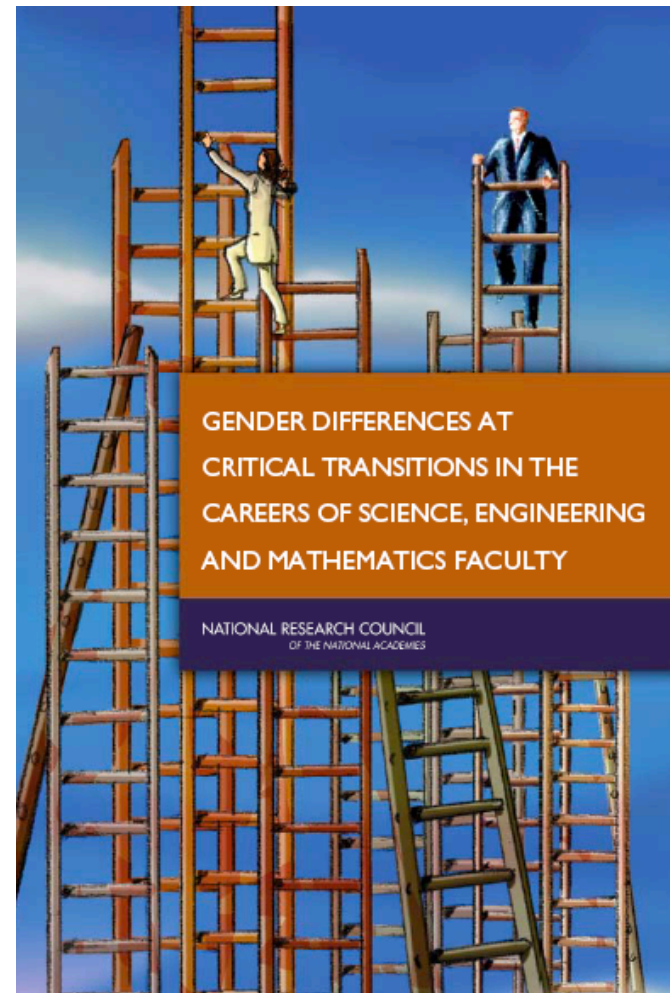
National Academy of Sciences
National Academy of Engineering
Institute of Medicine
National Research Council

Report of the National Research Council

- Began Jan 2004
- Released June 2009
- Published book due shortly

This Talk:

- Summary of Key Findings
- Personal observations and comments



Committee on Gender Differences in Careers of Science, Engineering, and Mathematics Faculty

- **Claude Canizares**, *Co-chair*, Vice President for Research and Associate Provost and Bruno Rossi Professor of Experimental Physics, Massachusetts Institute of Technology
- **Sally Shaywitz**, *Co-chair*, Audrey G. Ratner Professor in Learning Development and Co-Director, Yale Center for Dyslexia and Creativity, Yale University School of Medicine
- **Linda Abriola**, Dean of Engineering and Professor of Civil and Environmental Engineering, Tufts University
- **Jane Buikstra**, Professor of Bioarchaeology, Director, Center for Bioarchaeological Research, School of Human Evolution and Social Change, Arizona State University
- **Alicia Carriquiry**, Professor of Statistics, Iowa State University
- **Ronald Ehrenberg**, Director, Cornell Higher Education Research Institute and Irving M. Ives Professor of Industrial and Labor Relations and Economics, Cornell University
- **Joan Girgus**, Professor of Psychology and Special Assistant to the Dean of the Faculty for Matters Concerning Gender Equity, Princeton University
- **Arleen Leibowitz**, Professor of Public Policy, School of Public Affairs, University of California at Los Angeles
- **Thomas N. Taylor**, Roy A. Roberts Distinguished Professor, and Senior Curator of the Natural History Museum and Biodiversity Research Center, University of Kansas
- **Lillian Wu**, Director of University Relations, IBM Research
- Acknowledgement: Catherin Didion, John Sislin, Peter Henderson, Jong-on Ham (NRC)

Congressional Request

- PL 107-368 Section 18 (b), “study shall build on the Academy’s work on gender differences in the careers of doctoral scientists & engineers and examine issues such as faculty hiring, promotion, tenure, and allocation of resources including laboratory space.” **National Science Foundation funded the study.**
- Resulted from 2002 **hearings on Title IX** with respect to mathematics, science, and engineering education held by Senator Ron Wyden (D-OR), then chair of the Subcommittee on Science, Technology and Space.

Characteristics of Survey

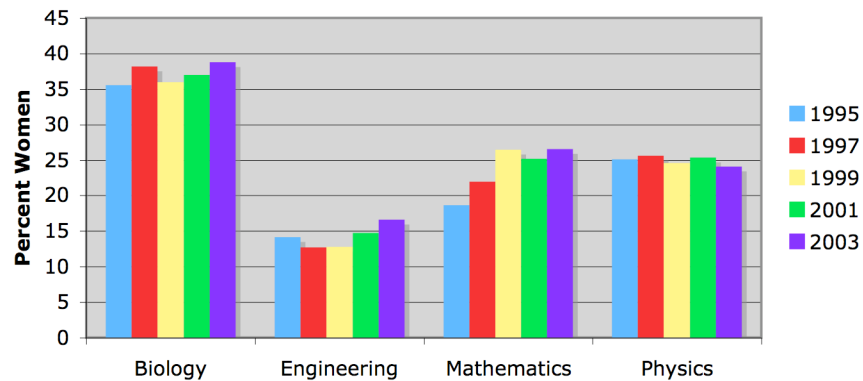
- Committee conducted two national surveys in 2004 & 2005
- Snapshot in time, not a longitudinal view.
- Six disciplines: *biology, chemistry, civil engineering, electrical engineering, mathematics, and physics.*
- Surveyed 89 major research universities, referred to as Research Intensive (RI) institutions.
 - 500 departments (85% response rate)
 - 1,800 faculty (73% response rate)
- Only full-time, regularly appointed tenure-track professorial faculty
- Focus on Critical Transitions:
 - Hiring
 - Promotion (tenure, full professor)
 - Resources
 - Some data on climate & outcomes

Overall Finding - 1 Representation

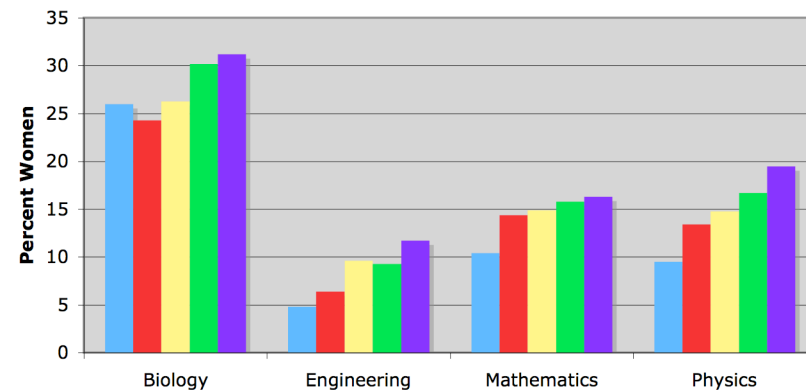
- Although women represent an increasing share of science, mathematics, and engineering faculty, *they continue to be underrepresented in S&E disciplines.*

Res-I Universities, Tenured & Tenure Track Faculty 1995-2003

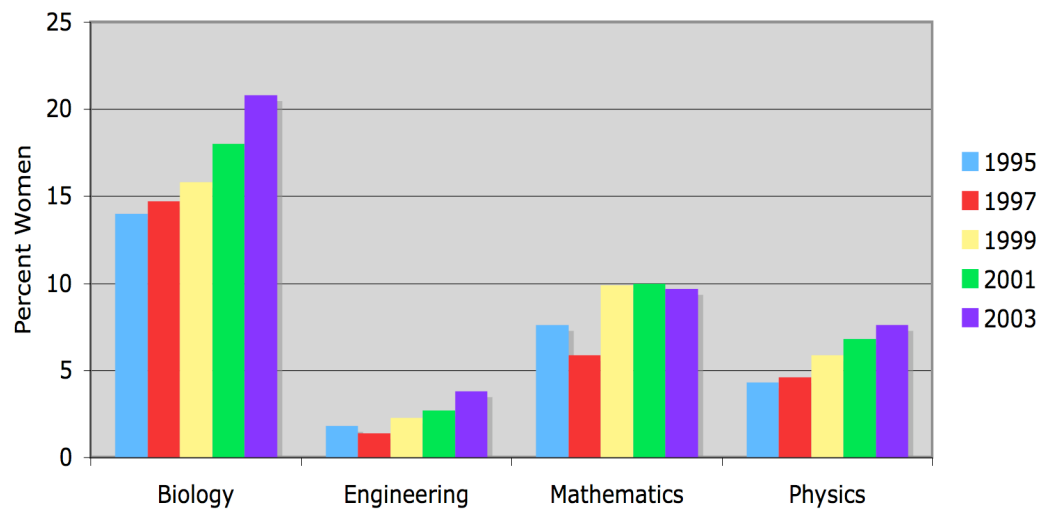
Assistant Professor



Associate Professor



Professor



NSF SDR

Overall Finding - 2 Transitions

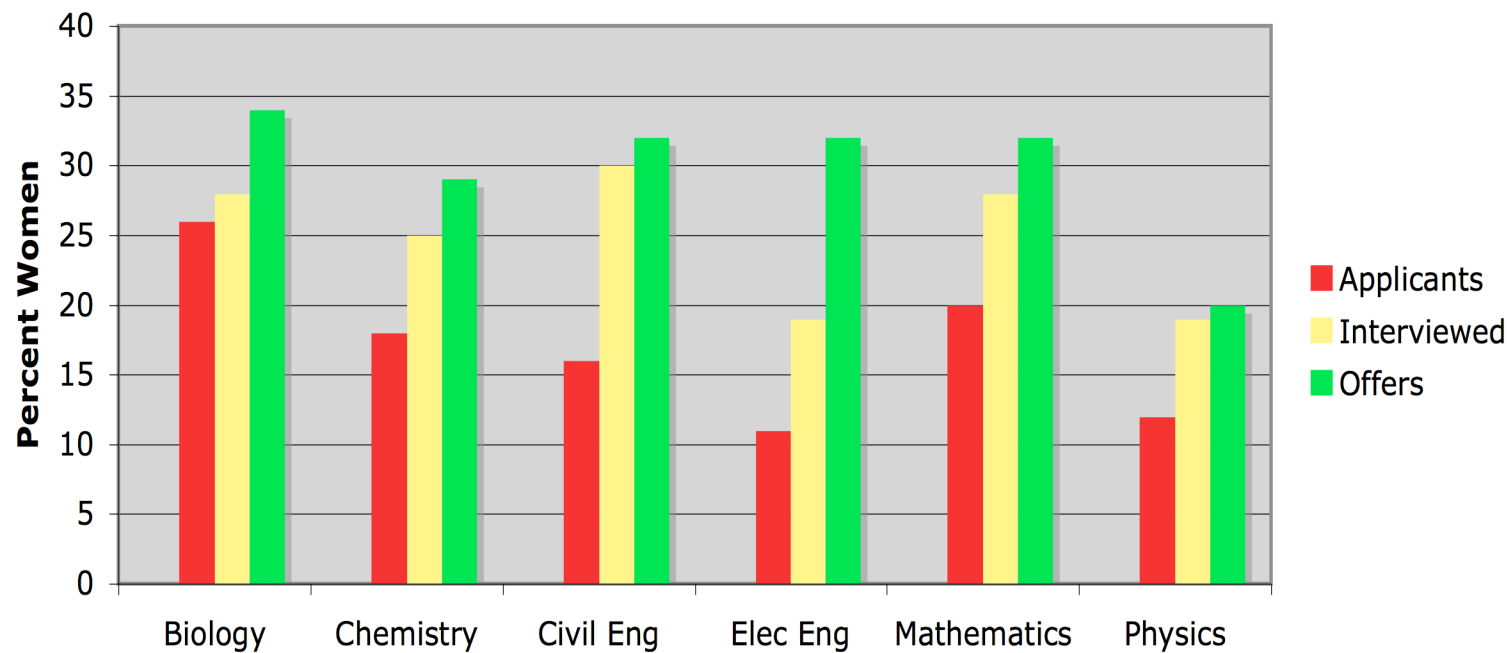
- For the most part, **men and women faculty** in science, engineering, & mathematics have **enjoyed comparable opportunities within the university**, and gender does not appear to have been a significant factor in a number of important career *transitions* and *outcomes* at the time of our study.

Findings #1-2

Hiring

- The proportion of women invited to *interview* for tenure-track positions was higher than the percentage of women *applicants*
- The proportion of women who received the first job *offer* was higher than the percentage who were invited to *interview*

Tenure Track Hiring Process



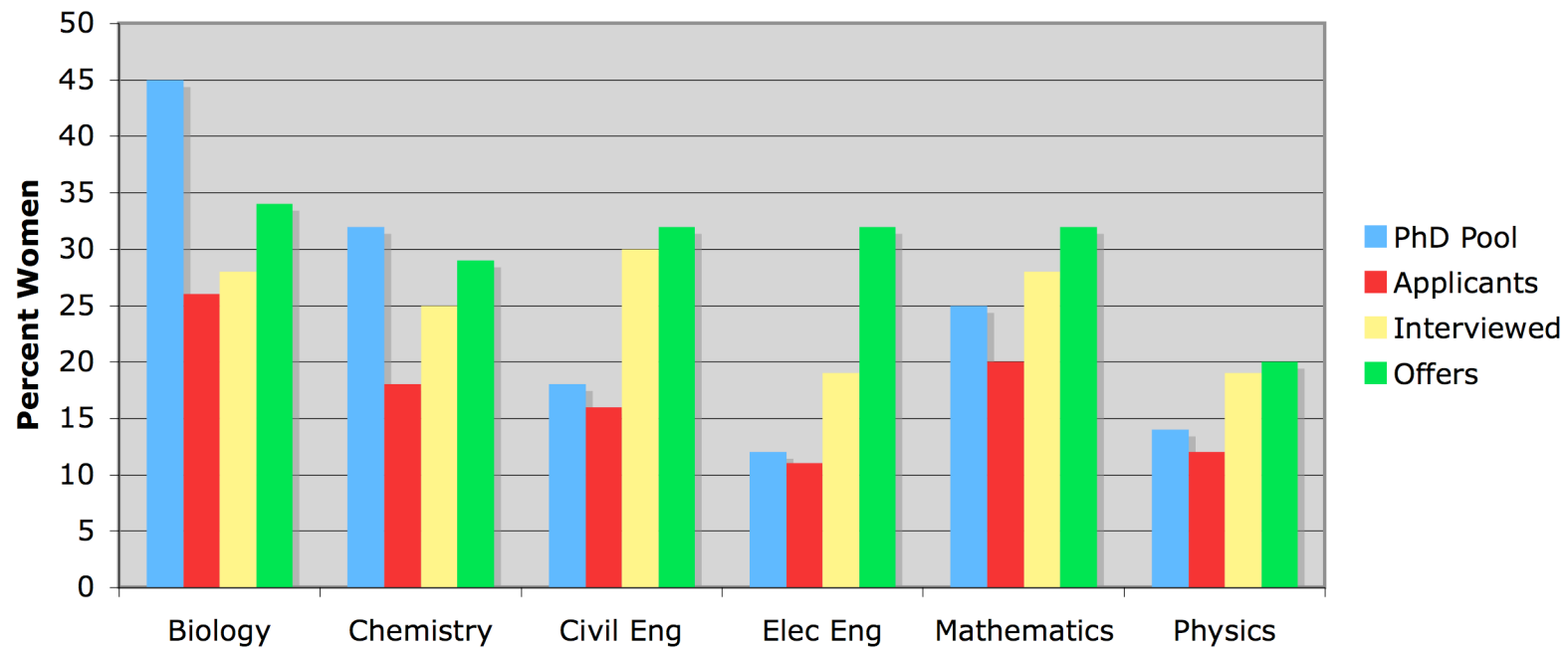
Finding #3

Hiring

BUT:

- In each of the six disciplines, the proportion of *applications* from women for tenure-track positions was *lower than the percentage of PhDs* awarded to women

Tenure Track Hiring Process



Finding #4

Hiring

- Most institutional & departmental strategies proposed for increasing the proportion of women in the applicant pool were not strong predictors of the percentage of women applying.
- The proportion of females on the search committee and whether a woman chaired the committee were both significantly and positively associated with the proportion of women in the applicant pool.
- Almost two-thirds of the departments in our sample reporting they took *either no steps or 1 step* designed to increase the gender diversity of the applicant pool.

Finding #5

Professional Experience

- Male & female faculty have similar access to many kinds of institutional resources and similar professional lives
- Similar proportions of their time on teaching (41% M vs. 43% F), research, & service
- Comparable access to most institutional resources (start-up packages, initial reduced teaching loads, travel funds, summer salary, supervision of research assistants & postdocs).
- At first glance, men seemed to have more lab space than women, but this difference disappeared once other factors such as discipline & faculty rank were accounted for

Finding #6

Professional Experience

- Women (tenure track) were more likely to have mentors than men (57 % F vs. 49% M).
- No differences between male & female faculty in chairing committees (39% M vs. 34 % F) and being part of a research team (62 % M vs. 65 % F).

Finding #6 (cont'd)

Professional Experience

- No difference in reports of discussions with colleagues on teaching, funding, interaction with administration, & personal life
- Women less likely to engage in collegial conversation on professional topics, including research, salary, & benefits (also interaction with other faculty & departmental climate)

Finding #7

Professional Experience

- Men & women had comparable outcomes on most key measures (publications, grant funding, nominations for honors and awards, salary, & offers of positions in other institutions).
- Little or no significant difference in refereed publications between men (13.9 publications) & women (12.8 publications)

Finding #7 (cont'd)

Professional Experience

- Comparable probability for having grant funding
- Female assistant professors *with mentors* had a higher probability (93%) of having a grant than those without mentor (68%)
- Men with no mentor had an 86% probability of having grant funding versus 83% for those with mentors.

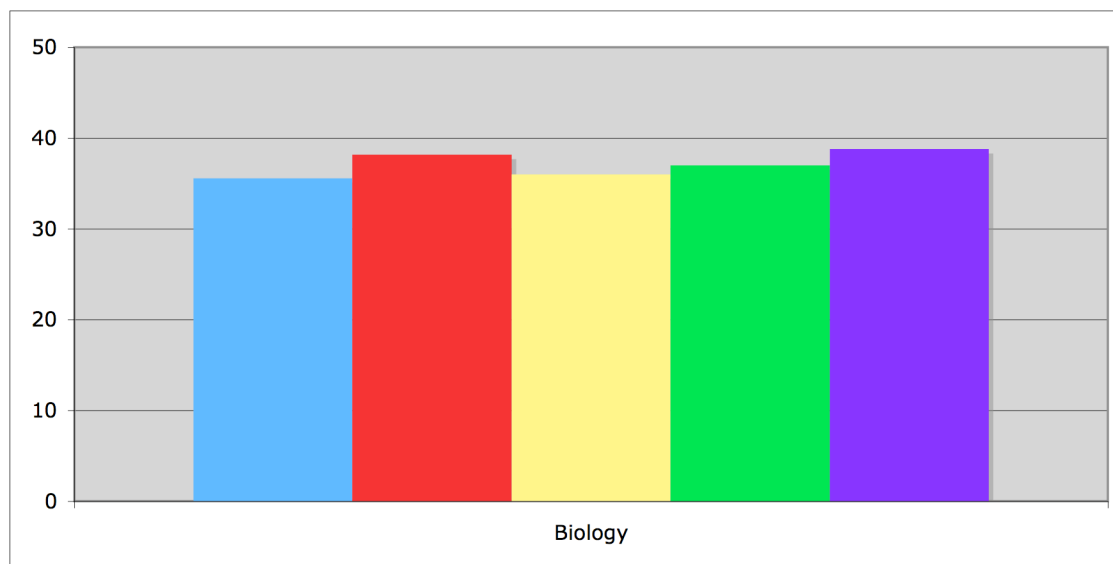
Finding #8

Promotion to Tenure

- Proportion of women candidates for tenure was smaller than the proportion of female assistant professors (discrepancy largest in biology & chemistry)
- Possible explanations: (i) women assistant professors more likely to leave before being considered for tenure (ii) reflects increased hiring of women assistant professors in recent years

Finding #8 (cont'd)

2004-2005	Percent	Women:
	Asst Prof	Up for Tenure
Biology	36	27
Chemistry	22	15



R1 Bio Asst Prof

% Women '95-'03

NSF: SDR

Finding #9

Promotion to Tenure

- Women were tenured at the same or a higher rate than men (an overall average of 92% for women and 87% for men).
- Women were more likely to be promoted when there was a smaller proportion of females among the tenure-track faculty.
- Discipline, stop-the-clock policies had no effect on the probability of a positive tenure decision for either male or female faculty members

Finding #10

Promotion to Full Professor

- No significant gender disparity existed at the stage of promotion to full professor.
- Women were proposed for promotion to full professor at approximately the same rates as they were represented among associate professors.

Finding #11

Time in Rank

- Time in rank as an assistant professor has increased over time for both men & women

Mean Years from PhD to Associate Prof.
Current Assoc Prof - Current Full Prof

	Men	Women
Biology	4.7	1.1
Chemistry	1.4	3.3
Civil Eng	4.9	1.0
Elec Eng	2.7	-0.7
Math	-1.2	1.1
Physics	2.4	0.8

Finding #12

Clock-stopping

- Stopping-the-clock did not affect the probability of promotion & tenure; but delayed it by about a 1 ½ years.
- Effect of stopping-the-clock is similar for men & women who stopped it
- Clock-stopping used by 19.7 % of women assistant professors vs. 7.4% of men, and 10.2 % of women associate professors vs. 6.4% of men

My Personal Opinion:

Good News and Bad News

- Good news - institutions are, on average, addressing most of the factors under their control
- Bad news - we still have a long way to go
 - Must treat this as a “systems” problem
 - System appears to have significant “friction”
 - “Nature of the profession” may be key underlying problem (i.e. years to tenure)

My Personal Opinions: Good News and Bad News

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- Bad news - we still have a long way to go
 - Must treat this as a “systems” problem
 - System appears to have significant “friction”
 - “Nature of the profession” may be key underlying problem (i.e. years to tenure)

Has the profession become unattractive to BOTH men and women, just differentially more unattractive to women?

For Additional Information:

- www.nationalacademies.org (webcast of briefing)
- www.nap.edu (PDF of pre-publication)
- www.nationalacademies.org/cwsem/ (Committee on Women in Science, Engineering, and Medicine's web site)
- www.nationalacademies.org/cnstat/ (Committee on National Statistics' web site)